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ABSTRACT

This article describes the process of institutionalization of science, technology, and society studies taking place in Cuba during the 1990s. It discloses the characteristics of the Master's program currently being developed in collaboration with the Universities of Havana, Cienfuegos (both in Cuba), Oviedo, and Barcelona (both in Spain). The article comments briefly on some of the characteristics of the process of institutionalization, relating them to the theoretical traditions that have been most influential and to the social processes that provide particular orientation. (Author/WRM)

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GRADUATE PROGRAMS IN SCIENCE, TECHNOLOGY, AND SOCIETY IN CUBA: RELEVANT CHARACTERISTICS*

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This essay describes the process of institutionalization of STS studies taking place in Cuba during the 1990s. In particular, we disclose the characteristics of the Master's program currently being developed in collaboration with the Universities of Havana, Cienfuegos (both in Cuba), Oviedo, and Barcelona (both in Spain). We comment briefly on some of the characteristics of the process of institutionalization, relating them to the theoretical traditions that have been most influential and to the social processes that provide particular orientation.

Traditions

During the decade of the 1990s, the institutionalization of STS studies has taken place in Cuba in a process that shares several characteristics with the field as it has developed in other countries. As is well known, STS studies constitute an important field in academic research, public policy, and education. This field attempts to understand the social aspects of scientific and technological phenomena, in respect to their social conditions as well as to social and environmental consequences. Its general focus is of a critical character (in contrast to the classical visions of science and technology) and interdisciplinary (where disciplines such as the philosophy, history, and sociology of science and technology, among others, converge). STS today defines an institutionally well-consolidated field in universities, agencies of public administration, and educational centers of numerous industrialized countries, as well as in some countries in Latin America (see Medina and Sanmartín, 1990; and González et al., 1996).

*A future issue of the *STS Newsletter* will include a summary of a related STS program at La Universidad de Cienfuegos. -SHC, Editor

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Since the beginning of this decade in Cuba, STS studies have constituted an emerging program with similar characteristics. Immediate antecedents are situated in the 1980s with the parallel development of several disciplines that today approximate a common project. Since the 1980s, courses in the philosophy of science have been offered in different universities, most notedly at the University of Havana, and at the Cuban Academy of Sciences, which promotes research in the fields of the history of science and of scientific and technological policy.

The theoretical background for these studies can be found in the Marxist tradition and more directly in the way it was institutionalized in what were once the U.S.S.R., the German Democratic Republic, and other European socialist countries. A careful look at the academic activity done in those countries reveals a certain diversity of foci and projects. The one we emphasize most is the attempt to develop a general and integrative theory of science in the U.S.S.R. and East Germany, whose immediate inspirations were the ideas of J. D. Bernal regarding the need for a science of science. (See, e.g., Domin and Reinhard, 1969; Velikov et al., 1980; and Bernal, 1939.)

Through exchanges that used to take place with greater ease and frequency, this approach had a certain influence on Cuban academic life, introducing an agenda that contained three basic goals:

a) development of studies about the science-technology-society relationship;
b) promotion of interdisciplinarity for this purpose; and
c) the attempt to make such studies useful, at least in the fields of political science, technology, and educational policy.

Another notable influence came from Latin American thought. During the 1960s there developed an authentic Latin American thought about science-technology-development-dependency (see Sábato, 1969; Varsavsky, 1969; Herrera, 1976; and Varsavsky, 1986; among others) oriented toward the problems of science and technology in Latin America. This thought was especially influenced by the great paradigms of Latin American sociological and economic thought: "cepalismo" [so named after the work of the Centro Económico para América Latina or CEPAL] and "dependentismo" (see Sonntag, 1988).

Among the themes discussed by this thought are technological dependency; technology transfer; and the relationship between science, technology, and industrialization. More recently, the problems related to technological innovation, the environmental impact of technology, and, above all, the relationship of all of these to social development, have become important themes for Cuban academic and social life.

While STS studies in other countries have been modeled after the American and European tradition (as illustrated in González et al., 1996), in Cuba—without excluding authors situated from the American and European traditions (Thomas Kuhn, for example, was received and discussed in the 1980s; see Núñez, 1985 and 1989)—contributions coming from East European and Soviet scholars and Latin American thinkers played a fundamental role until the beginning of the 1990s. During the 1990s the works of many other North American and European authors, including various authors from Spain, have been incorporated into the courses being offered. In addition, we have followed attentively the attempt to re-articulate a Latin American thought that in matters of science and technology argues against economic and technocratic developmental positions (for example, Herrera et al., 1994; and Dagnino, 1996).

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Social Conditions

Together with these influences that permeate STS studies in Cuba, several social circumstances that condition its significance and orientation should be noted.

1. During the last four decades Cuba has made a significant effort in education, science, and technology. Given the population growth rate and amount of available resources, the indicators in these fields are among the highest in Latin America (see Fernández and Núñez, 1998). It might even be said that the country has bet on education, science, and technology. Even in the middle of the most recent economic crisis, this effort has been maintained in some areas and multiplied in others (the biosciences, biotechnology, and the pharmaceutical industry). As with any developing country, Cuba faces an extraordinary scientific and technological challenge.

2. Cuban scientific and technological development has been associated with evident political priorities. The emphasis on science and technology was at a very early point incorporated into the Cuban political and ideological discourse (Fidel Castro, Che Guevara), and in correspondence with it, numerous practical actions have been unleashed. Accordingly, successive generations of scientists and professionals have been asked not only for technical skills but also for an ethical behavior that transforms the work they do for social benefit. The Cuban scientific community has expressions of social commitment infrequently found in Third World countries. The existence of an "Ethical Code for Cuban Scientists" in a certain way reflects all of this. In other words, the scientific, technological, and educational development in Cuba shows through what usually interests STS studies: the close relationships between science, technology, and society and between science, technology, politics, and values.

3. The debate surrounding the development of science and technology in Cuba has frequently had a public character, and many citizens participate in diverse ways. A clear expression of this is the so-called "Science and Technical Forum," an experience of public participation that still requires detailed study, but that without doubt demonstrates its singular character.

4. As part of the transformations the country is going through, some innovations have been introduced in the conception of scientific and technological politics, which were summarized in the creation of a National System of Science and Technological Innovation. This process demands preparation of competent persons. For the characteristics of the project being served, the fundamental element in the conformation of the system is society and its developmental programs. In this context, the adequate understanding of the relationship between science, technology, and development becomes a fundamental theme.

5. Cuban universities acknowledge that technical-scientific formation has to be accompanied by humanistic formation, which determines the presence of courses in the social sciences and humanities in all university degrees. It has been found in the 1990s that STS studies are a privileged vehicle for this purpose.

Institutional Forms

In accordance with all of the above, STS studies have been consolidated in an institutional position in the following fundamental ways:

- creation in 1991 at the University of Havana of the Group of Social Studies of Science and Technology and, later on, the Group for the Study of Technolog[illegible] at the Higher Polytechnic

Institute "José Antonio Echeverría" of Havana (both groups have organized courses, promoted publications, symposia, and other activities);

- creation in 1997 of STS graduate programs (master's and doctorate levels) in the history of science and the management of technology fields, belonging to the Ministry of Science, Technology, and the Environment, with the participation of several Cuban universities and research institutes;
- inclusion of dissertations about STS as requirements for promotion in the categories of instruction, research, and doctorates;
- incorporation in STS courses of diverse graduate programs—management, education, and others; and
- introduction of STS courses (about 32 hours) in all majors of scientific and technological profiles including, to some extent, even medical studies.

As an example of the characteristics of the STS programs that are being developed, we will present relevant aspects of the Master's Program in STS. Cuban master's programs take an average of two years and require at least 70 credits (15 hours each), with a final thesis that measures the research skills of the student. University graduates as a rule have completed five years of study at the bachelor's level before undertaking these programs. The Master's in STS began to be offered in 1997 at the Universities of Havana and Cienfuegos, with the collaboration of professors José Antonio López Cerezo and Manuel Medina of the Universities of Oviedo and Barcelona, respectively, in Spain.

The realization of this program has been possible by virtue of the collaboration of several Cuban institutes: the University of Havana, the University of Cienfuegos, and the Higher Polytechnic Institute "José Antonio Echeverría," as well as the Center for Technological Management and the Institute for the History of Science and Technology, both part of the Ministry of Science, Technology, and the Environment. All of these institutions have been working on themes of interest to STS and since 1997, under the coordination of the Faculty of Philosophy and History at the University of Havana, to develop a Master's program that integrates their efforts. Master's students come from all of the country's provinces and are predominently university instructors in the social sciences, researchers, and persons dedicated to the study of technological innovation.

The objectives of the program are varied, but through the discussion of the readings studied in STS, the completion of theoretical/empirical research associated with the Master's program, and professional practice related to this profile, at the end of the program the student must be able to:

- assimilate, evaluate, critique, and apply the main contemporary theoretical developments in the STS studies field;
- perfect the STS teaching programs in effect in Cuba and impart them;
- formulate and complete STS research projects within the guidelines defined by the program;
- evaluate and project educational processes in centers for higher education that involve STS knowledge and foci; and
- promote techno-scientific diffusion.

The program is composed of 74 credits, half of which are required courses and half of which are distributed in the following manner:

Thesis: 20
Publications and/or participation in Congresses: 5
Thesis seminars: 12

Research activity constitutes the driving force behind the program. The disciplines share similar theoretical frameworks and analogous pragmatic concerns. They are guided by defined general objectives, all of which promote coherence at the program level as a whole. The research orientation of the program emphasizes the theoretical-empirical study of scientific and technological problems through the following topics:

History of Science and Technology;
The Management of Science and Technology;
Scientific and Technological Education;
The Impact of Science and Technology; and
Theoretical and Methodological Problems in STS Studies.

The Master's thesis is defended in any of the fields mentioned and constitutes the result of an investigation by which students demonstrate that they know the "state of the art" in their chosen field, allowing them to select the theoretical and methodological frameworks best suited to their objectives. Students are able to develop, through a theoretical-empirical search, the proposed investigation under the guidance of a mentor. Preferably, the thesis must conform to practical suggestions that correlate to the objectives of the program.

Subject area courses offered during the program are the following:

Overview of STS Studies: 2 credits
Research Methodology: 3 credits
Introduction to the History of Science and Technology: 4 credits
Epistemology and Philosophy of Science: 4 credits
Sociology of Knowledge, Science, and Technology: 2 credits
Philosophy of Technology: 4 credits
Science, Technology, and Social Development in Latin American Thought and Action: 3 credits
Ethics of Science and Technology: 2 credits
Administration of Science and Technology: 3 credits
Environment and Development: 2 credits
Education and Development: 2 credits
Economy and Technological Change: 2 credits
Legal Regulations of Science, Technology, and the Environment: 2 credits
Scientific Research and Graduate Degrees in Institutions of Higher Education: 2 credits
Thesis Seminar: 12 credits

This program has a faculty of twenty-five professors, twenty-two with PhDs. All are active professors and researchers.

Final Considerations

The process of institutionalization of STS studies in Cuba converges with the objectives and interests assumed in other countries. It has, however, its peculiarities in relation to the paradigms that have influenced it and also to the social circumstances that surround and give it meaning. We pursue the development of an academic program that actively participates in the political projections for science and technology, in the social debate about the orientation of scientific and technological development and its social consequences, and in education at all levels. Our academic strategy takes into consideration three fundamental variables for its consolidation: the local academic structure with its traditional strengths and weaknesses, the social mechanisms and the cultural strategies that influence our project and that at the same time we want to influence, and finally the consolidation of a solid network of international communication that will permit fruitful exchange. A case in point for this last comment is the collaboration with Spanish professors and universities.

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